

COST OF FLEXIBLE AND DISTANCE LEARNING

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1. INTRODUCTION

Improving productivity is a permanent goal in the business world. In order to improve productivity, production procedures as well as the skills and expertise level of employees are crucial variables. Training is therefore a central issue for most companies.

Training, however, is expensive. In the traditional situation when an employee is sent to a training course, there are three aspects that constitute a major part of the costs:

- a. the registration fee for the training course
- b. travel and accommodation costs
- c. opportunity costs: the employee is away from work and therefore is not productive.

Bringing down the costs of training can be looked upon as bringing down the costs of each of these components.

In principle, the registration costs can be brought down when a course can be delivered to a large audience. In this respect the economy of scale should do the work. Travel and accommodation costs can be lowered when the training course can be delivered near the working place of the employee. Using a distribution mechanism that takes this aspect into account can be a solution in this respect. An obvious direction for a solution is the use of communication technology (using video via television-broadcast, satellite, ISDN, Internet, or even via videotapes sent through regular mail; e-mail and computer conferencing) or using the traditional distance delivery of printed material. The loss of productive time for the employer could be dealt with when an employee is willing to attend the training in his/her own 'free' time.

All of these aspects and/or combinations of them, constitute a more 'flexible' training situation than what is done in a more traditional situation. The target of such a more-flexible training situation is to present a more cost-effective solution to the training problem.

2. THE TELESCOPIA PROJECT

To illustrate how more-flexible learning can be realised, the Telescopia (1995) Project is taken as example. The Telescopia (TransEuropean Learning System for Crossborder Open and Interactive Applications) project is a one year project funded by the Commission of the European Community.

Investigating cost-effective solutions is one of the main objectives of the Telescopia project. The target of the project is to realize a communication technology infrastructure comprising interactive television, interactive audio-video connections using ISDN, and a variety of facilities, such as computer conferencing, not requiring an ISDN connection.

Six course providers participated in the project offering a diversity of courses to students and trainees. Each course provider offered a variety of communication technology facilities. Two aspects are of specific interest: (a) how is the prime information of the course distributed?, and (b) how can students interact with the teachers (and with other students)? In very global terms these provisions can be described as follows (each course provider will be mentioned by a capital letter A-F; for further details see the final report of the Telescopia project): course A offered WWW-facilities and videoconferencing; course B offered lectures to students who were distributed through an internal video-conferencing distribution system, e-mail, telephone and connections between lectures and students via microphones; course C offered interactive television and videoconferencing via ISDN; course D offered television-broadcasting via satellite, regular mail, fax, telephone, and e-mail; course E offered computer conferencing, interactive TV, telephone, e-mail, and fax; course F offered via ISDN connections the Pro-Share desktop conferencing application. The main reason for this description is not to go into specific technical details. The reason for mentioning the technologies is to illustrate that each of the course providers used a rather different set-up and telematics platform.

An important aspect of the project was to gather data about the cost-effectiveness of the different course provisions. Originally the intention was even to find a relationship between the level of cost-effectiveness of each approach and the technical configurations used. However, given the demonstrator approach of the project, and given the limited number of participants in the courses that were offered by the course providers, trying to find a valid and reliable measure of effectiveness cannot be very successful. Therefore, the focus of the investigation is mainly on the cost issue.

3. DATA COLLECTION

Method

Within the Telescopia project various questionnaires were dispersed. These included course provider questionnaires, learner questionnaires and tutor questionnaires. In addition to the questionnaires the checklist for course providers has been used.

The results of these questionnaires are summarized in the Final Report of Telescopia (Köhler & Collis, 1995). These results however, only gave a global insight in the issues. Therefore, to get a more detailed insight in the costs, an interview with a cost expert in every course provider's organization was organized. Such interviews were held with five of the six course providers. Although many attempts were made, no interview nor (reliable) quantitative data could be gathered from one course provider. Therefore this course provider is left out of the further quantitative analysis.

Method for Analysis

The course provider questionnaires and the checklist for course providers yielded primarily qualitative data about costs and effectiveness. These data were looked at and taken into account when considering the data yielded by the interviews. The interview data were both qualitative and quantitative. The latter were used to calculate the costs per student per hour which was further taken as the unit of comparison.

The data yielded by the learner questionnaires were also primarily qualitative. These data were looked at to get some understanding about how learners view the costs and effectiveness of the course they took at the course provider's organization.

4. RESULTS

Course Provider: Questionnaire Data

All six course providers returned the Course Provider Questionnaires (Parts I and II). Course providers were asked about the importance of costs and effectiveness in the context of the TeleScopia project. Costs were mentioned as important for two course providers and not important for another two. From the remaining two, no clear answer was received. The two course providers who found that costs were an important issue were both operating on a more-or-less commercial basis. The two course providers that mentioned that costs were not important gave as an explanation that the costs were provided on a project basis. Costs are only an important issue when they are part of a real commercial enterprise.

Four course providers responded that effectiveness is an important issue. However, asked for further explanation, none of them clearly described how they interpreted effectiveness nor how they were going to measure its impact. All of them gave some broad description of activities that probably could be related to effectiveness issues without being exact or precise. One course provider said for instance: 'WWW was chosen in order to increase effectiveness and bring in more flexibility in learning, tutoring and coordination'. Effectiveness is seen as something that is 'good', and therefore should be aimed for. Unless clear statements about measurable objectives and criteria are formulated in advance, the effectiveness issue will remain at a very global, almost philosophical level. Therefore it was said before that in this report and given the circumstances of the project, it was not sensible to go into further detail about effectiveness.

Learner: Questionnaire Data

The return rate of the Learner Questionnaires (Parts I and II) was 30 % (73 out of 243 questionnaires). Within the questions related to costs, a distinction was made between external and internal costs. External costs are equal to the registration fee for the course. Internal costs are all other costs made by the learner, such as costs for traveling and for the acquiring of devices necessary to participate in the course.

Most learners considered the external costs inexpensive. This result is not surprising because only a very small number of the learners had to pay a fee. When there was a fee, this fee was approximately 500 ECU. Internal costs were estimated being around an average of 447 ECU, while for 60% of the responders the amount was below 200 ECU. A total of 80% of the respondents found these internal costs reasonable or inexpensive.

A high percentage (75%) of the respondents found the courses (moderately) effective. As no criterion was given to indicate what was meant by 'effective', respondents expressed only their general feelings with respect to this issue.

Costs Per Trainee/Hour

In order to get a comprehensive and comparative overview of the costs for the respective course providers, Table 1 was produced. An interpretation of those data is provided as well as some tentative conclusions.

Table 1 shows data from five of the six course providers. The figures in the tables were calculated or derived based upon the information given by the course providers. Most of these data were gathered during the interviews with the course providers. It cannot be excluded that, due to misunderstanding and/or miscommunication between the researchers and the course providers, some data deviate from reality or are not complete. The researchers take the responsibility for the data as presented.

It is the strong impression of the researchers that exact cost data are often not available. On the other hand, the researchers are convinced that the data provided represent a fair estimate of the costs. It is also the impression of the researchers that as course provision evolves towards a serious commercial enterprise instead of being in a kind of 'experimental' or 'subsidized project' stage, knowledge of the exact costs of activities becomes a more serious issue.

In Table 1 the following aspects are covered:

- *Course Provider*: The public or commercial organization that provides the course.
- *Development costs*: Costs to develop the learning material in such a way that the learning material does not need to be updated during the lifetime of the course.
- *Operating costs*: Costs needed to deliver the course during *one* round; exploitation and maintenance costs during or as a result of a round of the course.
- *Lifetime*: The *expected* number of course-rounds before the course material has to be updated or revised; the lifetime is given as an estimate by the course providers.
- *Total costs*: The sum of development and operating costs.
- *Contact time*: Time that trainees spend on contact-related activities (for instance: watching a video provided by the course provider, watching a broadcast by the course provider, communicating with a tutor in a face-to-face fashion or through using telecommunication facilities, etc.). These figures have been mentioned by the course providers.
- *Total study-time*: Time that trainees spend on the whole course. These figures have been estimated by the course providers.
- *Trainees (expected)*: The *expected* number of trainees for one course-round as mentioned by the course providers.
- *Trainees (TeleScopia)*: The number of trainees actually involved in the TeleScopia course.

With respect to the descriptions above, there are some difficult conceptual issues to deal with. One of these issues is how to give reliable indications of the 'total study time' a trainee spent on a course. It is clear that the total study time used by a student will vary to a large extent, so how to deal with this kind of variability? Courses delivered in a more-traditional situation (for instance a university) are often labeled by so-called study points or credits. A study point (SP) is a measure of the amount of time a student is expected to work on a course. For instance: 1 SP equals one week (40 hours) of work. A course worth

Table 1. Overview of costs calculations (in ECU)

Course provider	Development costs	Operating costs per round of a course	Lifetime (number of course rounds)	Total costs per lifetime	Contact time per course round (in hours)	Contact time per lifetime (in hours)	Total study time per course round (in hours)	Total study time per life-time (in hours)
A	76,000	132,500	2	341,000	25	50	135	270
B	20,000	10,000	3	50,000	12	36	40	120
C	726,000	113,000	5	1,291,000	40	200	70	350
D	30,000	40,000	10	430,000	5	50	60	600
E	30,000	115,000	10	1,180,000	18	180	84	840

Course provider	Operating costs/contact hour	Operating costs/ hour total study time	Total costs/contact hour	Total costs/hour total study time	Trainees/course round (expected)	Trainees/course round (TeleScopia)
A	5,300	981	6,820	1,260	75	21
B	833	250	1,390	420	40	48
C	2,800	1,600	6,460	3,690	1,000	125
D	8,000	666	8,600	720	40	21
E	6,400	1,370	6,560	1,400	20	23

Course provider	Operating costs/ contact hour / trainee (expected)	Operating costs/ hour total study time / trainee (expected)	Operating costs/contact hour/trainee (TeleScopia)	Total costs/contact hour/trainee (expected)	Total costs/hour total study time/trainee (expected)	Total costs/contact hour/trainee (TeleScopia)
A	70	13	252	91	24	324
B	21	6	17	34	10	28
C	2.8	1.6	22	6.5	3.6	52
D	200	17	381	215	18	409
E	320	68.5	278	327	70	312

3 SP means that a student is expected to work a total of 120 hours on this course. This amount includes the contact time (following classes, maybe private face-to-face tutoring by a tutor, and the time needed to do the exam) and the private study time (reading and studying the book or notes taken, talking with colleagues, working in the library, preparing for the exam). All kind of detailed schemes can be worked out in order to relate the allocated study time of a course to the number of classes, number of pages of required reading, etc. This kind of approach could also be used to estimate the total study time that trainees spend on a course in the new situations as available in the TeleScopia project. That information however is not available. Therefore the available figures are estimations by the course providers. In addition the question can be put forward if the measure of total study time should be related to a cost calculation. In a cost calculation both the costs for the course provider and the costs of the trainees should be taken into account (see earlier). This approach is based upon the philosophy of 'cost ingredients' as advocated by Levin (1983). With respect to the costs to be allocated to the trainee, these costs should (at least) consist of three parts: (a) external costs (course fee), (b) internal costs (costs in order to be able to take the course, such as travel time, technological provisions at home, etc.), (c)

costs connected with the time a trainee spent in order to follow the course. As has been mentioned above, there are some indications about the external costs and the internal costs of the trainees in the Telescopia project. It was also mentioned that in the case of the Telescopia project, course fees were not asked for. This is certainly not a situation that reflects a real-life situation. Further, there are no data available about the total time trainees spent on the course, nor whose time trainees were using (their own 'free' time, or regular 'work'-time). For these reasons, cost calculations in Table 1 only refer to costs made by the course providers.

Another difficult issue is the numbers of trainees that followed (or were expected to follow) the course. Normally this number is obvious: it is the number of trainees that paid the course fee. However in the case of the Telescopia courses, course fees were (in most cases) not applicable. In addition, the marketing of the Telescopia courses, due to the experimental nature of the situation, cannot be considered as a regular course provision for which elaborate marketing efforts would have been undertaken. For these reasons the cost calculations are based upon two kind of data: (a) the number of trainees that actually started with the courses, and (b) the number of trainees the course providers expect in a regular situation will register for the course when a normal marketing approach can be applied. Calculation of costs/hour/trainee takes as a reference the expected number of trainees. As these expectations vary a great deal per course provider, the obtained results show a large diversity of outcomes.

In order to be able to compare the different courses from a cost perspective, a number of measures have calculated:

- *Operating costs/contact hour*: The operating costs covered by the course provider to provide one contact-hour during a particular round of the course.
- *Operating costs/total study-time hour*: The operating costs covered by the course provider to provide one study-hour during a particular round of the course. As the costs for the students are not taken into account (see earlier), these figures are underestimations of the real costs. As at the same time the estimation of the total study time should be interpreted as less reliable, these figures should be interpreted with care.
- *Total costs/contact hour*: The total costs covered by the course provider to provide one contact-hour to during one particular round of the course. These figures take into account the development costs and the operating costs. The development costs are equally spread over the number of sessions as indicated by the course providers. These are the most interesting figures as they reveal the differences of the costs in comparison with the different delivery platforms.
- *Total costs/total study-time hour*: The total costs covered by the course provider to provide one study-hour during a particular round of the course. See earlier remarks with respect to total study time.
- *Operating costs/contact hour/per trainee*: The operating costs covered by the course provider to provide one contact-hour to *one* student during a particular round of the course. This measure can be used to make a comparison between the different course providers. At the same time it should be realized that the number of expected trainees is an estimation given by the course providers. A significant deviation of this number will change the results.
- *Total costs/total study-time hour/per trainee*: The total costs covered by the course provider to provide one study-hour to *one* student during a particular session. See earlier remarks with respect to total study time.

5. INTERPRETATION OF THE RESULTS

- a. There is a significant difference between the cost figures of one course provider (B) and the others. It is unclear if this difference represents a real difference, implicating that the B approach is much cheaper than the others, or if the differences have occurred because of misunderstandings or misinterpretations of the cost factors that should have been taken into account. Because of this uncertainty, the B figures are set aside with respect to the following conclusions.
- b. The most interesting figure is the total cost/contact hour. Although the four remaining course providers each have a substantially different delivery approach, the total cost/contact hour is within a very small range around 7.000 ECU.
- c. Another interesting figure is the total cost/contact hour/expected trainee. Because of the large variability in expected trainees, there is a large variability in these costs (range: 6.5 - 327 ECU). Given the specific circumstances and potential target groups, one can expect a broad range of course fees for different courses.
- d. When an average and acceptable estimate is taken for a course fee/contact hour, a calculation can be made about the minimum numbers of participants needed in a course to reach a cost break-even point. It can be argued that in a commercial context 60 ECU/contact hour is a reasonable fee. In that case and taking 7.000 ECU as an average total cost/contact hour, the number of participants per session needed to reach the break-even point of a course is approximately 120. When we compare this amount with the expected number of trainees as expressed by the course providers, only one course provider is able to cover the costs of a course. Although 120 participants seems to be a rather small number when considering a European market, one has to realize that language barriers can act as a limiting factor, or when a language barrier is not an issue because the potential trainees are all fluent in, for instance, English then it could well be that the potential target group is probably highly specialized and therefore limited in numbers. If courses aim at a broader public and are provided on a much lower course fee (for instance 5 ECU/contact hour), the minimal number of students to break-even is around 1400 per round of the course.

6. CONCLUSIONS

Based upon these results the following conclusions can be formulated:

- a. There is no significant difference in total costs/contact hour between delivery systems using different telematics platforms. The total cost/contact hour is approximately 7.000 ECU.
- b. When commercial rates are used as course fees for courses delivered using different telematics platforms, a minimum of a 120 participants per course-session is necessary in order to reach the cost break-even point.
- c. When non-commercial rates are used as course fees, a number of around 1000 participants per course-session is necessary in order to reach a cost break-even point.

Future research has to be done in order to get better and reliable cost data from the point of view of the course providers. In addition, insight in cost issues from the point of

view of trainees needs an even a higher research priority. Finally, more fundamental research has to be set up with respect to the possibilities to obtain valid and reliable effectiveness data.

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